Water resilient green cities in Africa Newsletter issue 3

Catchment plans as basis for effective actions

Liu, Li; Jensen, Marina Bergen; Herslund, Lise Byskov; Fryd, Ole; Assefa Wondim, Alazar; Adugan Belete, Dagnachew ; Onesmo Mpyanga, Simon

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Water Resilient Green Cities in Africa

Newsletter

June 2017

Catchment plans as basis for effective actions

With catchment plans we can provide an overview of the situation and present suggestions on what needs to be done. Therefore, the development of a convincing catchment plan is one of the primary goals of the project. Now, the ideas developed in researchers' workshops and in design charrettes with local stakeholders are described in more detail and some of the key concepts have been tested in pilot projects.

Scientific approach

Basically, the catchment plans took form by first delineating the catchment hydraulically by use of GIS, then describing the current challenges of water shortage, flooding and erosion as well as the current coping strategies practiced by the residents, and then finally fitting the suggested landscape-based ideas into the catchment in the best possible way and to the necessary extent. By presenting the ideas in straight forward text supported by a series of relevant illustrations, we anticipate there is a good chance the catchment stakeholders will buy in and make the ideas their own. Thus, the detailed description of the catchment plan to some degree mimics a set of guidelines on how to implement green infrastructures for better water supply, reduced problems with flooding, control of erosion and reestablishing of the vegetation cover.

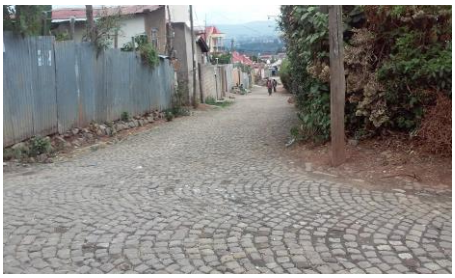
Different stakeholder compositions, different hand-over activities

Despite the two catchments can benefit from similar green infrastructure measures, their stakeholder compositions are rather different, which is reflected in the hand-over activities. Thus, in Addis Ababa, where the city administrations are implementing housing schemes and has a financing model for public-private road constructions, the catchment plan is aligned with these programs, while in Dar es Salaam the catchment strategy are targeting more directly the residents, wards and sub-wards of the catchment with less dependency on initiatives from the city administration, although the embedding and overall coordination is considered most important also here. Some handover activities have taken place, as described below, and more are to come, including a refining of the catchment plan to target specific stakeholders, e.g. the road construction authorities of Addis Ababa, and the sub-wards of case catchment in Dar es Salaam. The suggested catchment plans will be made publically available when the research findings have been published.

Dar es Salaam team communicating their catchment strategy of the project case area with the local community

PhD projects updates

Alazar Assefa Wondim has conducted two pilot experiments and one GIS analysis, and is now focusing on presenting the results in scientific papers. The first pilot experiment was to test a novel drainage principle for cobble-stone roads, based on infiltration and linked to a tree planter, thus preventing flooding and improving conditions for street greening in the same solution. Cobble-stone roads are forecasted to be the dominant pavement of Addis Ababa thanks to a local source of igneous (or ignimbrite) rock. He has also tested the capacity of an infiltration area receiving stormwater runoff from roofs in a condominium. The purpose of the GIS-analysis is to consider conditions for upscaling of the landscape-based stormwater management (LSM) elements to the full catchment, including considerations on local adaptation and dimensioning of the novel cobble-stone principle depending on street slope, street width and hydraulic conductivity of the subbase. Further, the design of infiltration elements linked to watering and establishment of vegetation is detailed.



Cobblestone road in Addis Ababa. Improvement of its drainage design can reduce both downstream flooding and erosion of the road pavement.

Dagnachew Adugan Belete has analyzed water samples from the rivers in the case catchment to state their condition and to compare the water quality under wet and dry weather conditions, with the overall perspective of recommending environmental protection actions targeting the well-known point sources like direct discharge of industrial wastewater, as well as the less-known diffuse pollution loads arriving to the rivers during storm events. Dagnachew is also considering the impact of large institutions if they act as forerunners in implementing landscape-based solution for stormwater drainage and water supply for stormwater management, taking a single institution as case and attempting to scale up. He is now focusing on writing up these findings. Also, he is writing up his investigation of the current drainage

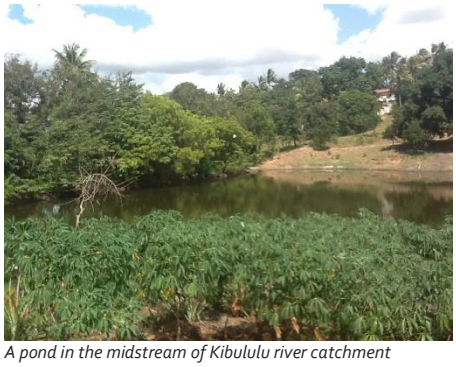
conditions of Addis Ababa by taking two case sites in the old and new parts of the city.

Given Justin Mhina has finished describing the challenges in the case catchment in Dar es Salaam, and thus pinpointed the starting conditions for implementing the suggested green infrastructure strategy. The description includes the followings: a GIS-based delineation of the catchment verified by ground-observations, an estimate of the urbanization rate of the catchment based on historical satellite images, location and extent of wastewater discharge and solid waste dumping, extent and condition of man-made drainage systems provided by the city, extent and character of local stormwater harvesting, flood and erosion protection practices, and finally mind-set mapping of city officers towards conditions and future needs. Given is currently finalizing two additional studies including an assessment of stormwater runoff quality from ground and rooftops from perspectives of environmental protection and water harvesting, and a GIS-study on identification of flood prone areas in the catchment.

Liku Workalemahu Habtemariam has focused on the institutional setting for introduction of more landscape-based water management and also how it relates to urban livelihoods in Addis Ababa. He works within transition theory and has identified important champions and their character and behaviour. The main results show that executive champions with organizational power at the regime level are found to be important to link with project level champions at niche level. Liku is currently looking into how livelihoods in two typical communities, condominium housing and urban agriculture in Addis Ababa, manage water and green resources in order to identify key challenges and potentials for building water resilient livelihoods. Being dependent on natural assets makes the farming community vulnerable but also more flexible than people in condominiums that are locked into a malfunctioning conventional water system. Water resilience is needed as livelihoods are heavily affected by water shortage and floods, but urban institutions are not enabling a transition.

Martha John Mkupasi looks into the existing governance system for urban water and green infrastructure and its adaptive capacity for landscape-based stormwater management (LSM) in Dar es Salaam. Findings until now indicate that the planning and governance systems for urban water and green infrastructure are uncoordinated with overlapping responsibilities. The city is growing unguided and implementation of city plans and projects apart of being uncoordinated depends much on external resources. The adaptive capacity is low but at local level potential activities and initiatives for more LSM are practiced, however, mainly by individual households and not collectively in the communities. These local level coping strategies, if supported and strengthened, LSM to the urban planning and governance systems.

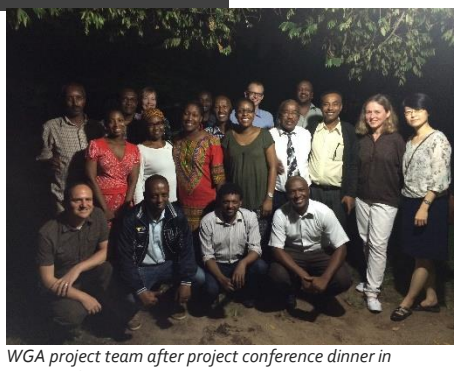
Simon Onesmo Mpyanga has explored options for merging indigenous stormwater management practices into urban water management in informal areas in Dar es Salaam. Accordingly, in peri-urban areas he has identified a number of indigenous practices on stormwater management through land modification and vegetated systems. In the Mbezi River catchment, he has identified residents' landscape contemporary strategies for coping with water challenges. Simon is currently analyzing if and how the indigenous practices can be transferred to more dense urban settings. For example, the Kilimanjaro region holds examples of vegetation-based practices, multi-functionality in the use of plant species, terracing, conservation of rivers, use of irrigation furrows etc. which potentially could complement the fragmented water management practices in the Mbezi informal urban areas. Landscape urbanism theory and the concept of landscape resilience are used as lenses for the discussion.



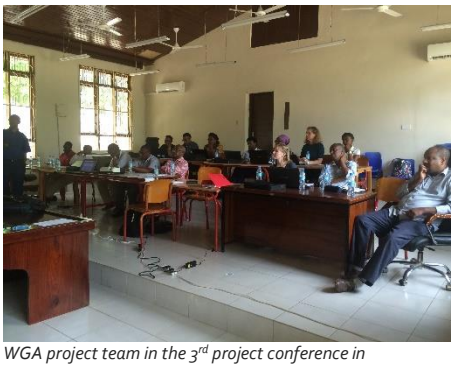
A pond in the midstream of Kibululu river catchment developed by the local residents for collecting stormwater for irrigating orchid

FAST FACTS

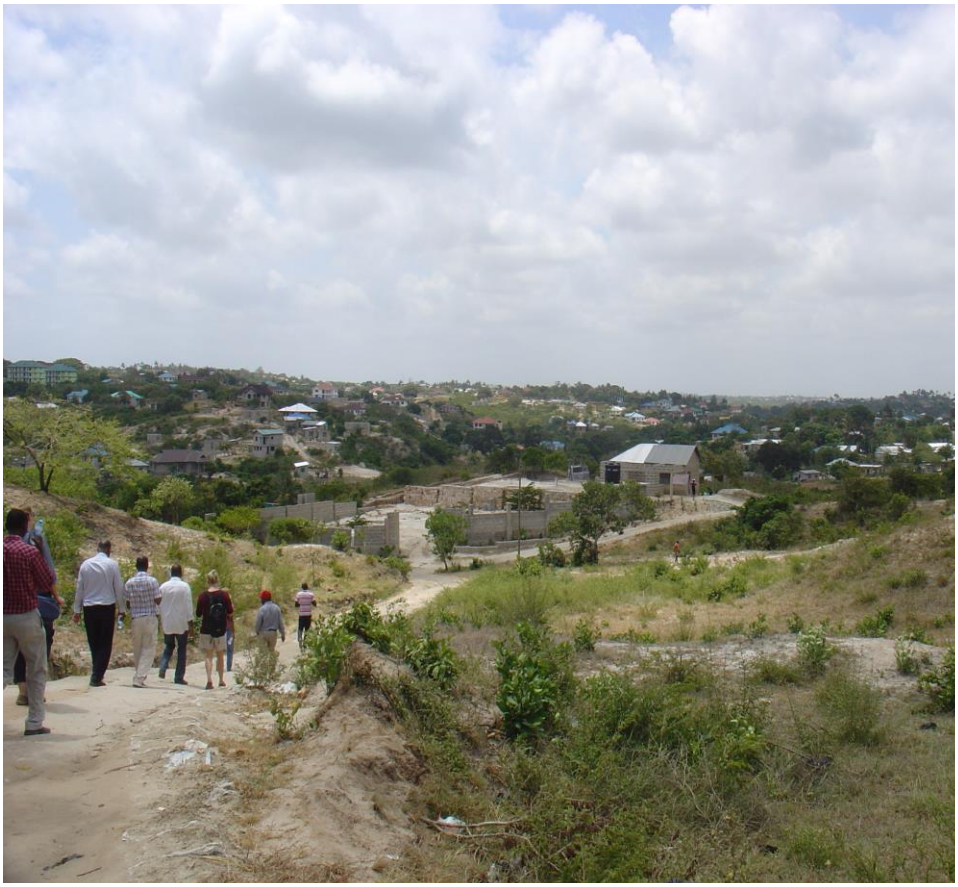
Project title:	Water Resilient Green Cities for Africa
Main funding source:	Danida
Duration:	September 2013 – August 2017 (The project is prolonged until December 2017)
Size:	9,054,244 DKK
Partnership:	Three partners from three countries
Coordinator:	Department of Geoscience and Nature Management University of Copenhagen
Website:	www.watergreenafrica.dk



WGA project team after project conference dinner in Dar es Salaam



WGA project team in the 3rd project conference in Dar es Salaam



WGA project team visiting the case catchment in Dar es Salaam

SELECTED PROJECT PUBLICATION

Scientific article

Sustainable urban drainage systems: examining the potential for green infrastructure-based stormwater management for Sub-Saharan cities

Intermediate results

Report2-WP1 Green space and livelihood in the WGA case sites of Addis Ababa and Dar es Salaam

Report2-WP2 Draft landscape-based stormwater management strategies for the Jemo and Mbezi River catchments

Report2-WP3 Local institutional frameworks at community level in Dar es Salaam and Addis Ababa

Conference presentations

Building water resilient green cities in Africa

Linking landscape based stormwater management with household and community livelihood in two African cities

Landscape based stormwater management strategy for Jemo river catchment, Ethiopia

Institutional opportunities and constraints for Integrated Urban Water Management (IUWM): The Case of Little Akaki River Catchment, East Africa

Community based planning for sustainable urban water management in Addis Ababa, Ethiopia

Climate change, urban vulnerabilities and green structures: Barriers and opportunities for low-income communities

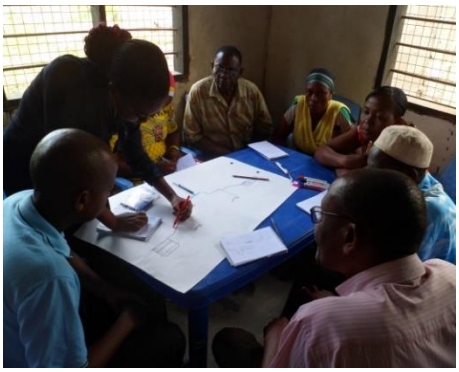
River water pollution in Addis Ababa, Ethiopia: A comparison of pollutant levels between Dry/Wet Season and Level of Urbanization

2nd Design charrette

Making a local plan for water resilience and increased ownership

At a three-day design workshop in one of the project case sites in Dar es Salaam, the local community developed a plan for increased water resilience together with researchers and designers from the WGA project and selected officials from local and central governments.

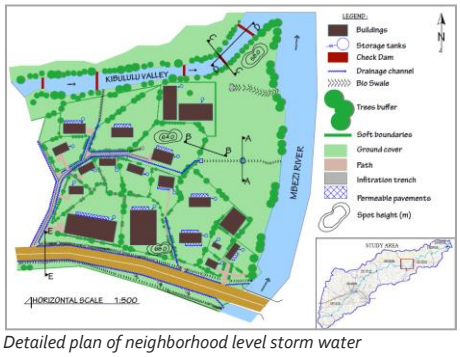
In an informal site like the project case area the community faces many challenges related to water management like water scarcity, soil erosion, seasonal flooding, encroachment of river buffer zones by informal settlements and illegal sand mining. They also see many opportunities in improved water management, many of which are already being used at household level and includes rainwater harvesting, retention ponds for fish farming, terracing and the use of vegetation to prevent erosion.



The workshop goes on. Challenges are identified and solutions drawn up.

The participants proposed solutions to a better management of water at three levels: household, neighbourhood and valley level. The specific objectives were to: 1) reduce and delay run-off at the source as much as possible; 2) reduce the impact of storm water flows on flooding and erosion; 3) use stormwater to promote livelihoods such as farming/crop production and animal husbandry, and reduce water stress at household and community levels; and 4) to develop green infrastructure to support and promote stormwater management.

At the final day of the workshop the participants evaluated on the workshop, a participant said: "*...I now know how to preserve stormwater for future use through infiltration, and also to cut costs of water by harvesting rain water. Normally I use 5-6 buckets of tap water (costing 2000-2400TShs) and about 10 buckets of water from borehole (costing 1500shs) per day. This is expensive compared to other daily uses".* According to the sub-ward leader, the demonstration project and the design charrette created motivation and a learning environment for inhabitants to implement LSM in their land parcels.



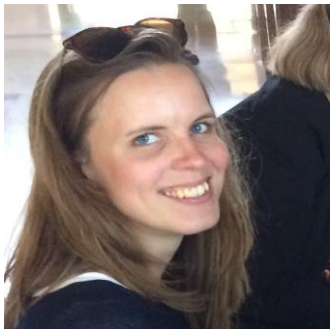
Detailed plan of neighborhood level storm water management strategies

A focus group discussion conducted four months after the workshop showed that LSM related activities had been implemented by various community members since. One respondent said since the charrette she managed to sensitize her neighbours and there are community members who started to harvest water after the sensitization.

WGA People

Associated

Jasmina Gabel has stayed in the Housing and Construction Bureau and the Urban Planning Institute in Addis Ababa from November 2015 to May 2016. She is an urban planner and landscape architect from Gladsaxe Municipality, Denmark. Aiming at experiencing a new culture and a completely different new context to work with climate adaptation issues, she spent almost a half year at Addis Ababa and took home lots of inspirations. Now Jasmina returns to Addis Ababa and works as a freelancer landscape architect.



INTERVIEW WITH JASMINA GABEL

What are your major gains of the stay?

It has been an eye-opener for me, e.g. they do not look at livability the same way we do. I think there are good elements to take to Denmark. What is so fascinating about Addis Ababa is that it has so much potential to get better, because they are building the entire city right now. They have potentials to learn experiences and lessons from other cities like Copenhagen, Berlin or London. But the challenge is that they want to move so fast, and they can forget important aspects to make a better city.

What do you think have been your contribution to Addis Ababa city?

I really think the training I did for the employees at the city administration has inspired them how they can approach water management in their day-to-day work. We started with discussing many key issues such as what is landscape architecture? What are the flooding problems, what is climate change, where is drought experienced, how to manage stormwater, how to enhance biodiversity, what is SUDS and re-use of water etc. I invited WGA team to introduce the project to the key persons from the city administration when we had the training, to give them faces on the people whom they could go to afterwards for more knowledge.

What will be your major suggestions to the city and WGA project?

The city has issues with traffic and pollution. So I think they can combine new investments in transport sector with good stormwater management. It is important to get the WGA project ideas implemented not only in the University, but also in the city administrations and people who build the condominiums, because they build so many condominiums. Every time they build, they should include sustainable stormwater management and combine with livelihoods improvements.

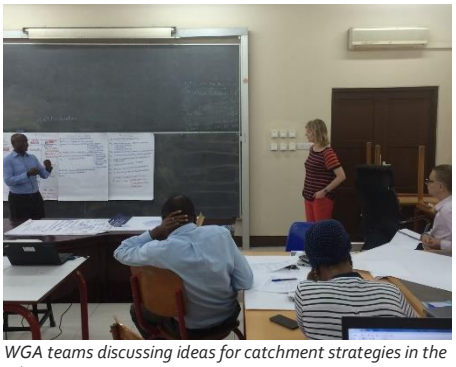
How was it to live in Addis Ababa?

I was worried about how I would fit in but now I know that it is a really nice and calm city. I think the trip was inspiring. When you see that you can actually change something by doing the work, it feels good. My initial focus was very much on stormwater management, but I ended up also taking a much broader perspective on urban livability and how landscape architecture can play a part. It is also what I am back to do, in cooperate sustainable and green water management in making Addis Ababa more livable.

A glance of the past year

3rd Project conference in Dar es Salaam
January 18 – January 22, 2016
In the 3rd Project Conference, all project members were gathered and discussed the project status and the future plan. The major topics addressed include:

- Discussion on report 2, especially the catchment strategies from water, green and livelihood and institutional aspects
- Integration various aspects & handover plan of the strategies to local stakeholders
- PhD students' progress
- Preliminary ideas of scientific papers, and plans for next year's progress
- Options for updating current curriculums at EiABC and Ardhi University with LSM
- A mid-term evaluation of our project progress, breakthroughs and bottlenecks


WGA teams discussing ideas for catchment strategies in the 3rd project conference in Dar es Salaam

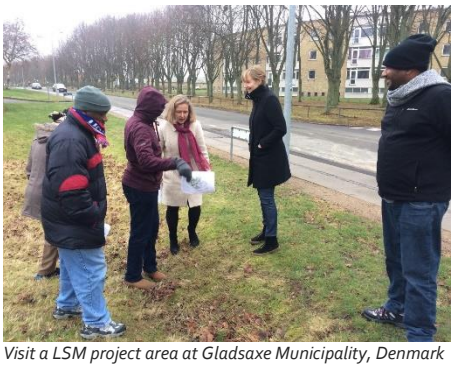
2nd design charrette held in Dar es Salaam
June 23-25, 2016
The 2nd design charrette was successfully held in the case area of Gobe-Kibululu in Dar es Salaam. A site plan was produced. See page4.

GIS training in Denmark
February 15 – March 13, 2016
IGN held a GIS training course on methods for quantitative hydrology estimation of urban catchments. The three PhD students Alazar, Dagnachew and Given who will apply GIS in their PhD projects, have successfully conducted a training course.

Catchment strategy through several loops
March – November, 2016
Preliminary catchment strategies based on the Report 2 findings were discussed during the 3rd Project Conference in Dar es Salaam. A "WGA 2016 Road map for strategy refinement and embedding in society" was outlined during the Project Conference. During the following months of 2016, through three loops of refinement where the three teams collaborated to add and improve the strategies, draft full-scale strategies for the case catchments were produced. Draft catchment strategies including plans and guidelines for the pilot sites have been discussed with the city administrations and local communities for their inputs.

Stakeholder meeting in Dar es Salaam
February, 2017
In February 2017, a workshop was held with City level stakeholders and selected Ward representatives. Initial ideas for catchment strategy and key areas for policy action were presented and discussed. The output of the workshop was a refined Catchment Strategy that comprised City level, Municipal and Ward (local community) level priorities of LSM actions as well as responsible actors from relevant government and non-government institutions. Also discussed were the challenges and opportunities for LSM adoption which assisted to refine the Strategy and actions so that they would make an impact on the community.

PhD students stay in Denmark
November 2016 – February 2017
Five WGA PhD students had a research stay at the University of Copenhagen and were accommodated at the Danida Fellowship Center, Denmark. A series of project workshops were held. A study tour to LSM projects in and around Copenhagen was also organized for them to learn the Danish LSM examples.


Visit a LSM project area at Gladsaxe Municipality, Denmark

Stakeholder meeting in Addis Ababa
February 17, 2017
Addis Ababa team held a stakeholder workshop on the draft catchment strategy "Landscape-based stormwater management strategy for Jemo River catchment". 40 experts from various offices of Addis Ababa City and Sub-city Administrations participated. Ato Yonas Ayalew, the head of the Addis Ababa Construction Bureau officially opened the workshop. EiABC team led by Dr. Kumelachew Yeshitela presented various aspects and results of the WGA project. The participants were then discussed in groups and came up with suggestions for finalizing the strategy document. Due to the success of the workshop, Ato Yonas Ayalew proposed presenting the same to city decision makers.

Dar es Salaam team in Danida Annual Thematic Meeting COSTECH at Dar es Salaam –*April 6, 2017*
Dar es Salaam team presented WGA project in the meeting with the title "Climate change, urban vulnerabilities and green structures: Barriers and opportunities for low-income communities".

Final project conference successfully held in Addis Ababa – *May 15-19, 2017*
During the conference, the mayor held a meeting with the WGA team leaders, despite being on his way to the airport. He confirmed the water challenges of the city, and suggested ways to take initiatives for improvement, highlighting the need for broad involvement.


Addis Ababa mayor meeting WGA team

At the handover conference, Dr. Kumelachew Yeshitela presented the full catchment plan to the heads of offices from the city administration, and handed it over to the city representative. Afterwards, the heads of offices presented their views on the strategy, largely endorsing it but also shared concerns on how to implement it. More about the final conference will be in the next issue of Newsletter.

The coming half year
The whole project team will focus on the final outputs of the WGA project and the PhD students will work intensively on their dissertations.
Addis Ababa and Dar es Salaam teams will continue to develop the catchment strategies into handover materials to the city administrations, local communities and practitioners.
LSM pilot demonstrations will be implemented in EiABC campus.
The catchment strategy of Dar es Salaam case will hold handover event in summer 2017.

WGA Partners

University of Copenhagen, Denmark

UNIVERSITY OF COPENHAGEN

Addis Ababa University, Ethiopia

EiABC
Ethiopian Institute of Architecture, Building Construction and City Development
Addis Ababa University

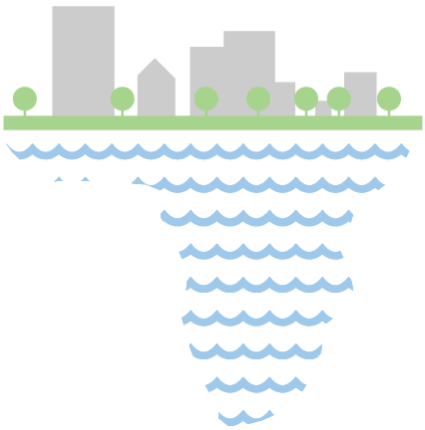
Ardhi University, Tanzania

ARDHI UNIVERSITY
UTAFITI ELIMU USHAURI

Water Resilient Green Cities in Africa

Project Management
Department of Geoscience and Nature Management
University of Copenhagen
Rolighedsvej 23
DK-1958 Frederiksberg C
Denmark

Li Liu (project manager)
Tel.: +45 35336774
Email: liu@ign.ku.dk



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